



United States
Department Of
Agriculture

Forest
Service

Shasta Trinity
National Forests

Reply To: 3420

Date: April 17, 1989

Subject: Evaluation of Continuing Tree Mortality in Flume and Sheep Camp Burns, Hayfork Ranger District (Report No. N89-6)

To: Forest Supervisor, Shasta-Trinity National Forests

Continuing mortality of trees which initially survived the fires of 1987 prompted Carl McMurtry from the Hayfork R.D. to request an evaluation of the situation. On April 4, 1989, Dave Schultz and Gregg DeNitto from the FPM Northern Service Area examined the Flume and Sheep Camp areas. They were accompanied by Lans Thornton and Jerry Brogan from the S.O. and Dave Wickwire, Hap Harrison, Roger Jaegel and several other people from the Hayfork R.D.

Following the fires of 1987, marking guidelines were developed on the Hayfork R.D. by modifying USDA-Forest Service, PSW Experiment Station Miscellaneous Paper No. 60 to meet local conditions. Burned areas were marked and salvage logged using the guidelines. Additional trees died following the salvage activities, which caused the District to question whether the guidelines were adequate.

After reviewing the existing marking guidelines and examining some of the trees that died following salvage logging, it is evident that the guidelines are accurate. Most of the dead trees examined would have shown enough damage at the time the area was originally marked to have met the criteria for removal. They were not marked during the original effort because they still had some green foliage. In all of the areas where dead trees were examined, there are also trees with green foliage that have bole and crown characteristics which indicate a high probability of tree death within the next few years.

The severely injured trees will not all die at the same time. They should be expected to fade as scattered individuals or possibly as very small groups during the spring, summer and fall of each year for as long as another five years. At some point the situation will generally stabilize as the most severely injured trees are eliminated, but fire-injured trees should be expected to die periodically whenever there is an additional stress such as drought. Occasional tree mortality can be thought of as a benefit if the injured trees were intentionally left for the purposes of enhancing woody debris recruitment or enhancing snag recruitment.

Trees with green foliage that meet the existing marking guidelines have either very small crowns or a large percentage of their conductive tissue damaged, or both. If very many of these severely wounded trees are intentionally left for the purpose of future timber growth, the results are likely to be disappointing. In addition to an increased probability of tree mortality, most of the severely wounded trees will experience a reduced growth rate. In some cases, the trees will be able to regenerate enough tissues within a few years to approach their





former growth rate, while the growth of more seriously injured trees will remain depressed for decades. The large basal wounds on some trees may become infected by decay fungi. The effects of slow growth and decay will have the greatest impact in young stands which will be carried the longest period of time until rotation.

The existing marking guidelines are adequate to identify severely injured trees based primarily on the amount of live crown remaining and percent of uninjured cambium. There are several qualifications when implementing the guidelines.

The guidelines list the maximum amount of fire-caused injury that trees will survive on a long-term basis. These results were obtained on better sites following normal precipitation. On average or lower sites, and particularly following below-average precipitation, the maximum amount of damage that trees can sustain is lower than the amount shown in the guidelines. Under the current conditions, the marking will be conservative if the guidelines are vigorously applied. Any attempt to relax the guidelines and leave more trees will increase the number of trees that die at a later date.

The guidelines were intended to be used on an individual tree basis. It can be extremely time consuming to attempt to use these methods over a large area. There are some indicators which can be used to detect areas where there is likely to be a concentration of severely injured trees. These indicators are not meant to be used alone to mark trees and, unfortunately, their absence does not indicate the trees are healthy. These indicators include: bark scorch height, foliage discoloration and woodpecker activity.

Areas where most of the trees have heavily charred bark to a height of 20 feet or more have usually been subjected to extreme heat. The cambium-girdling effect of extreme heat is generally more pronounced in younger, thinner-barked stands than in mature or overmature sawtimber. Areas with charring high on the bole can sometimes be detected from a distance and used to focus on an area where more intensive effort to apply the marking guidelines is warranted.

Foliage which is turning an unnatural color generally indicates that the tree is under severe stress or is beginning to die. Either fire damage, or below normal precipitation during 1987 and 1988, or both fire and drought may be responsible for making trees susceptible to attack by various beetles. Very commonly, the upper bole and larger limbs of trees which are turning color will be infested with some sort of bark beetle, engraver beetle or flatheaded borer. Large trees with thick bark may not show any signs of beetle infestation in the lower bole until well after the top has faded. Areas with any concentration of off-color trees are probably worth spending additional time applying the marking guidelines.

Woodpeckers sometimes begin working on a beetle-infested tree before the foliage has faded. Extensive woodpecker work usually means that the tree is dead. In most cases, nearby trees were exposed to the same stress factors and some may also be infested.

The guidelines for determining the probability for the survival of fire-injured trees are not a silvicultural prescription. The two primary uses of the guidelines are to identify trees with a high probability of dying in the near future to efficiently recover the wood where that is appropriate, and to gather





data on the stocking of trees likely to survive so that logical silvicultural prescriptions can be developed for the unit.

Management Alternatives

1. Remove trees only after they fade. This would require constant surveillance and numerous entries. With repeated entries the efficiency of wood recovery would be low and the probability of resource damage increases. Eventually some areas would become understocked. Some sites would be underutilized for years. Eventually some silvicultural prescriptions would become infeasible because of various combinations of low stocking, slash, fuel loads and lack of funding.
2. Aggressively salvage dead and dying trees. This would reduce the number of entries and maximize the recovery of dead wood. It would rapidly and more thoroughly lead to some sites becoming unstocked or understocked. Aggressive salvage could eliminate some future management alternatives.
3. Integrate salvage with silvicultural prescriptions. It would considerably increase the initial workload to carefully cruise all areas and determine the stocking of trees likely to survive through the next decade. If this information were available, it would allow decisions to be made on a unit basis. Some areas can be deferred with minimal losses, others will meet minimal stocking after salvage, some units will have enough viable overstory trees after salvage to be used as shelterwoods, and some units will have so few live trees they will have to be regenerated. While the time investment of cruising all areas in one operation is large, the total amount of time involved is probably less than that required visiting each unit several times over a span of several years. The greatest benefit would be to identify the optimal treatment for each unit at the earliest possible stage. This would preserve the largest number of options, allow for collections for necessary work, and require the fewest number of entries.

If you need additional information, please call Dave Schultz at (916) 246-5087.

/s/

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